

*ASTER SAXICASTELLII* (ASTERACEAE), A  
NEW SPECIES FROM THE ROCKCASTLE  
RIVER BARS IN SOUTHEASTERN KENTUCKY

JULIAN J.N. CAMPBELL

*School of Biological Sciences, University of Kentucky  
Lexington, KY 40506, U.S.A.*

MAX E. MEDLEY

*Department of Biology, University of Louisville  
Louisville, KY 40292, U.S.A.*

ABSTRACT

A new species is described, *Aster saxicastellii* Campbell & Medley. It is closely related to the northeastern *A. radula* Aiton, but differs in its chromosome number ( $2n = 54$ ); leaf-shape (broader, petioled, and more coarsely serrate); flowers (generally larger and paler); and cypselas (larger, pubescent, and with a white pappus). It has been found in only one locality, about 100 miles west of the most southern known station for *A. radula*. It grows on boulder-cobble bars along about three miles of the Rockcastle River in Pulaski and Laurel counties, Kentucky. It is concentrated in the shrubby transition from the open grassy bars to the adjacent forested terraces or slopes. This unusual vegetation is described.

During an inventory of rare species and natural communities in the Somerset District of Daniel Boone National Forest (Palmer-Ball et al. 1988), a new species of *Aster* was discovered along the Rockcastle River in Laurel and Pulaski counties of southeastern Kentucky. This paper describes the species and its special habitat, at the back edge of open rocky river bars. It appears most closely related to *Aster radula* Aiton, a wetland species of the northeastern Appalachians and the adjacent Atlantic Coastal Plain. Differences were determined from examination of over 200 herbarium specimens of *A. radula* (mostly from MO and GH) and from descriptions in various manuals (e.g., Fernald 1950, Strausbaugh & Core 1964, Cronquist 1980). Nomenclature for other vascular plants listed in this paper follows Kartesz & Kartesz (1980).

DIAGNOSIS

*ASTER SAXICASTELLII* Campbell & Medley, sp. nov. (Figure 1).

Ex affinitate *Aster radula* Aiton, sed folia mediacaulina late lanceolata, (3) 4–5 (6) cm lata et (7) 9–14 cm longa, lamina grosse serrata dentibus projectis 1–4 mm ex sino, supra glabrata vel versus marginem scabrida, basis angustata cum petiolo alato 0.5–3 cm longo;

capitula 1–10, 13–16 mm longa (ad termino pappi); bracteae involucales 1–2 mm latae fimbriatae cum cilia 0.2–0.5 mm longa ad margine, apices bractearum atrovirentes, obtusati vel subacuti; ligulae radii 1.5–2 mm latae, albae vel sublazulinae; cypselae pubescentiae, 4–7 mm longae; pappus albus; chromosomae,  $2n = 54$ .

TYPE: KENTUCKY. Laurel Co.: (Año 7.5' Quadrangle), open brushy area with sand over cobbles on the back edge of the boulder-cobble bar complex at the mouth of Pine Island Branch, 14 Oct 1987, *Medley & Campbell 18663-87* (HOLOTYPE: KY; ISOTYPES: EKY, GH, ILL, NY, SMU, US).

Other collections: KENTUCKY. Laurel Co.: (Año 7.5' Quadrangle), boulder-cobble bars on the the bank of the Rockcastle River at Beech Narrows, 2 Oct 1987, *Medley, Campbell & Wooley 18546-87* (EKY, KY). Pulaski Co.: (Año 7.5 – Quadrangle), boulder-cobble bars on the bank of the Rockcastle River at Beech Narrows, 2 Oct 1987, *Medley, Campbell & Wooley 18513-87* (EKY, KY).

The specific epithet *saxicastellii*, meaning “rockcastle,” refers to the Rockcastle River where this species was discovered. It is suggested that common name of this species be the “Rockcastle Aster.”

#### GENERAL DESCRIPTION

Plants herbaceous, perennial, colonial with long running rhizomes. Stems usually single, generally 4–12 dm tall, branching in the inflorescence, glabrous except for some pubescence in the inflorescence. Lower leaves broadly lanceolate to obovate, deciduous before flowering; mid-stem leaves broadly lanceolate with an acuminate apex and an angustate base, (3) 4–5 (6) cm wide and (7) 9–14 cm long, the winged petiole 0.5–3 cm long, the blade with 4–5 pairs of impressed primary veins, coarsely serrate except towards the apex and the base, with the teeth projecting 1–4 mm out from the sinuses, glabrous above or somewhat scabrous towards the margin, sparsely pubescent below; upper leaves reduced and usually entire. Inflorescence leafy, corymbiform, 2–10 cm wide, 3–20 cm long, with 1–10 heads. Heads each 13–16 mm long at maturity (to pappus tips). Involucre campanulate, 7–11 mm long; the phyllaries 1–2 mm wide, glabrous except for fimbriate cilia 0.3–0.5 mm long at the thin hyaline margins, their tips dark green, obtuse or subacute (with an angle of about  $90^\circ$ ), often slightly squarrose. Ray florets 10–30, white or pale blue, with ligules 10–15 mm long and 1.5–2 mm wide; disk florets 10–20, yellow at first, turning pinkish. Cypselas (4) 5–6 (7) mm long, fusiform-cylindric with 7–11 ribs, pubescent; pappus white, with bristles 5–7 mm long. Flowering mid-Aug. to early Oct. (Aug. only observed in cultivation). Chromosome number,  $2n = 54$ .

#### COMPARISON WITH *ASTER RADULA*

*Aster saxicastellii* is in subgenus *Aster*, section *Aster* (Jones 1980, Semple

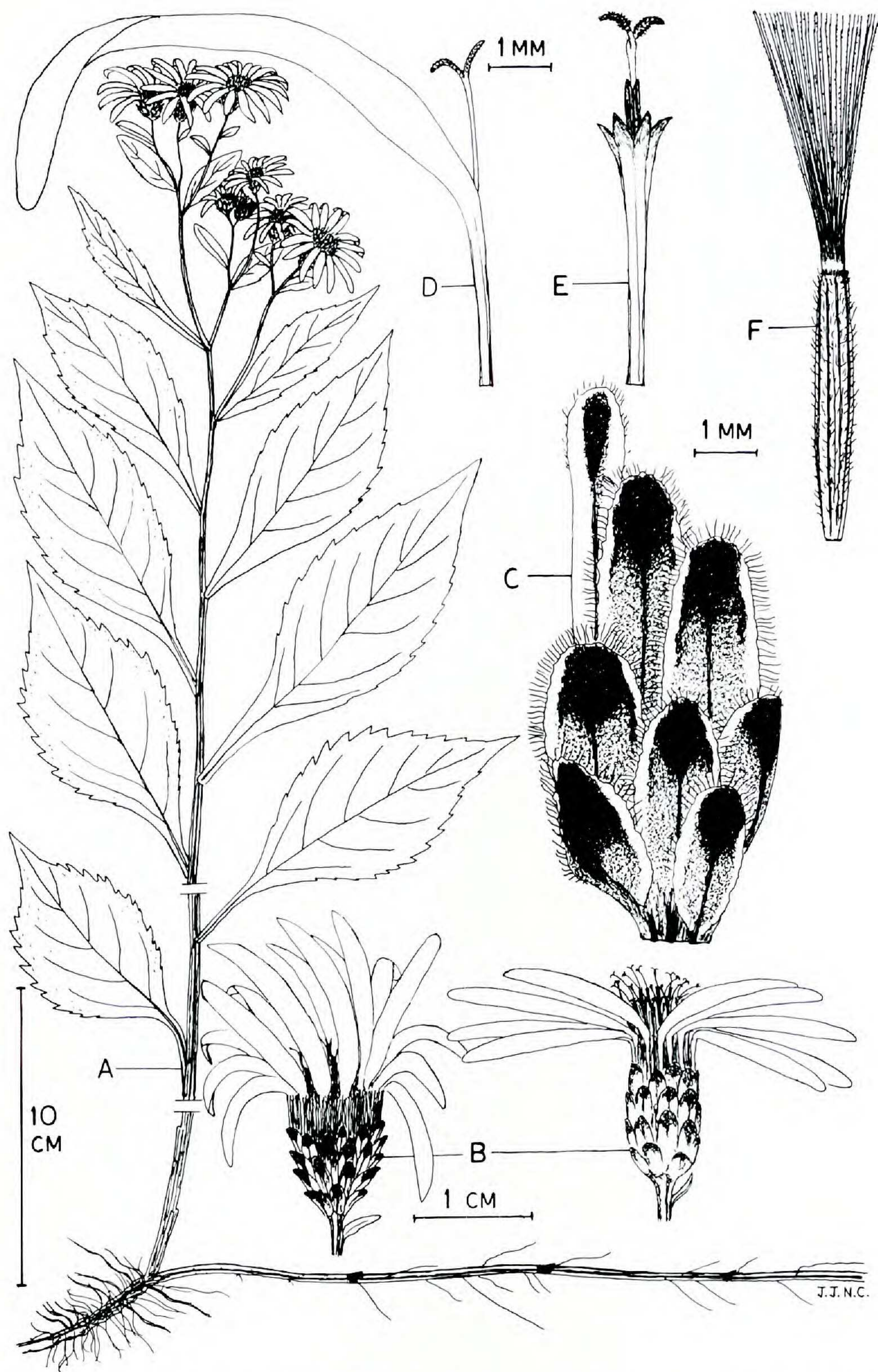


FIG. 1. Illustration of *Aster saxicastellii*, based on collections and photographs from the Rockcastle River. A: entire plant. B: flower heads, fresh (right) and in fruit (left). C: part of the involucre. D: Ray floret with ligule. E: disk floret. F: achene with pappus.

& Brouillet 1980), and is closely related to *A. radula*. It differs in its chromosome number, several morphological characters (Table 1), its range and its habitat. The chromosome number of *A. radula* is  $2n = 18$  (Semple et al. 1983), whereas that of *A. saxicastellii* is  $2n = 54$  (W.F. Lamboy & A.G. Jones, pers. comm.). This hexaploid number in *A. saxicastellii* accords with its generally larger dimensions. The morphological differences in *A. saxicastellii* can be summarized as follows: the leaves are larger, distinctly petiolate (vs. sessile or subsessile in *A. radula*), more coarsely serrate and less scabrous above; the flower heads are larger in most respects, but generally less numerous; the phyllaries have longer cilia; the ligules are fewer and paler; the cypselas are larger, pubescent, and have white (vs. pale brown) pappus. The most pronounced differences are in the leaves and the cypselas, whereas inflorescence characters generally overlap (Table 1). The mid-stem leaves of *Aster radula* decrease in average width and length towards the north, where a narrow-leaved form has been described as var. *strictus* (Pursh) Gray, but there is no bimodality in leaf-width within this species. In contrast, there is virtually no overlap in leaf-width between *A. radula* and *Aster saxicastellii*. Also, the margins and bases are consistently different. The cypselas have virtually no overlap in mature length, and the differences in pubescence and pappus color are clearcut.

*Aster saxicastellii* was found near the western edge of the Appalachian Plateau (Figure 2) at an elevation of 250–260 m, about 180 km (100 miles) to the west of the most southern record of *A. radula*. It occurs at the back edge of boulder-cobble bars that are often flooded but dry in the summer. *A. radula* is a true wetland species, occurring in bogs, wet meadows and streamsides of the northeastern Appalachians and the adjacent Atlantic Coastal Plain, from Virginia to Labrador. Its nearest known records are from higher mountains of the Ridge and Valley Province in Virginia (Harvill et al. 1986) and West Virginia (Strausbaugh & Core 1964), at an elevation of about (600) 1000–1500 m. It seems likely that *A. radula* extended further south during glacial periods, and that *A. saxicastellii* is a polyploid derivative from a relict population of *A. radula* that has now disappeared.

We have no reservation in describing our new species as distinct from *Aster radula*, after considering the nature of the differences in relation to similar patterns of speciation generally documented in flowering plants (Stebbins 1950). The differences seen here are typical of those that distinguish other species in the genus. They include differences in leaf shape and margination, and floral and fruit characters, not just differences in overall size, pubescence and other characters that can be affected more directly by

TABLE 1. Differences between *Aster saxicastellii* and *A. radula*.

CHARACTER		SAXICASTELLII	RADULA
Mid-stem leaves:	width	(3) 4–5 (6) cm	0.5–2.5 (3) cm
	length	(7) 9–14 cm	(3) 5–8 (10) cm
	serrations	extending 1–4 mm from sinuses	extending 0.5–1.5 mm from sinuses
	upper surface	glabrous or marginally scabrous	scabrous or rarely glabrescent
	base	angustate with winged petiole 0.5–3 cm long	cuneate and sessile or subsessile
Flower heads:	number/stem	1–10	1–15 (40)
	mature length (to pappus tips)	13–16 mm	8–11 mm
	involucral length	7–11 mm	(4) 5–10 (12)
Phyllaries:	width	1–2 mm	1–1.5 mm
	cilia length	0.2–0.5 mm	0.1–0.2 mm
	apex	obtuse/subacute	generally acute
Ray ligules:	number	10–30	(15) 20–30 (40)
	width	generally 1.5–2 mm	generally 1–1.5 mm
	color	white or pale blue	pale violet
Cypselas:	surface	pubescent	glabrous
	length	(4) 5–6 (7) mm	2–4 mm
	pappus	white	pale brown or rarely whitish
Chromosome number:		$2n = 54$	$2n = 18$

the environment. Stebbins (1950) pointed out that the former characters usually vary more at the species level within genera, than at the variety level within species.

#### ECOLOGICAL NOTES

*Aster saxicastellii* has been found only on sandstone boulder-cobble bars along the Rockcastle River. These bars are geomorphically stable, about 10–30 m wide and 30–100 m or more long, and dominated by grasses, forbs, shrubs and stunted trees. The lack of forest canopy is probably caused by the scouring of flash floods and by the summer drought stress on this well-drained coarse-textured substrate. Several patches of *A. saxicastellii* are scattered along about three river-miles, from Beech Narrows to Pine Island. The plants form clones, with long stolons growing

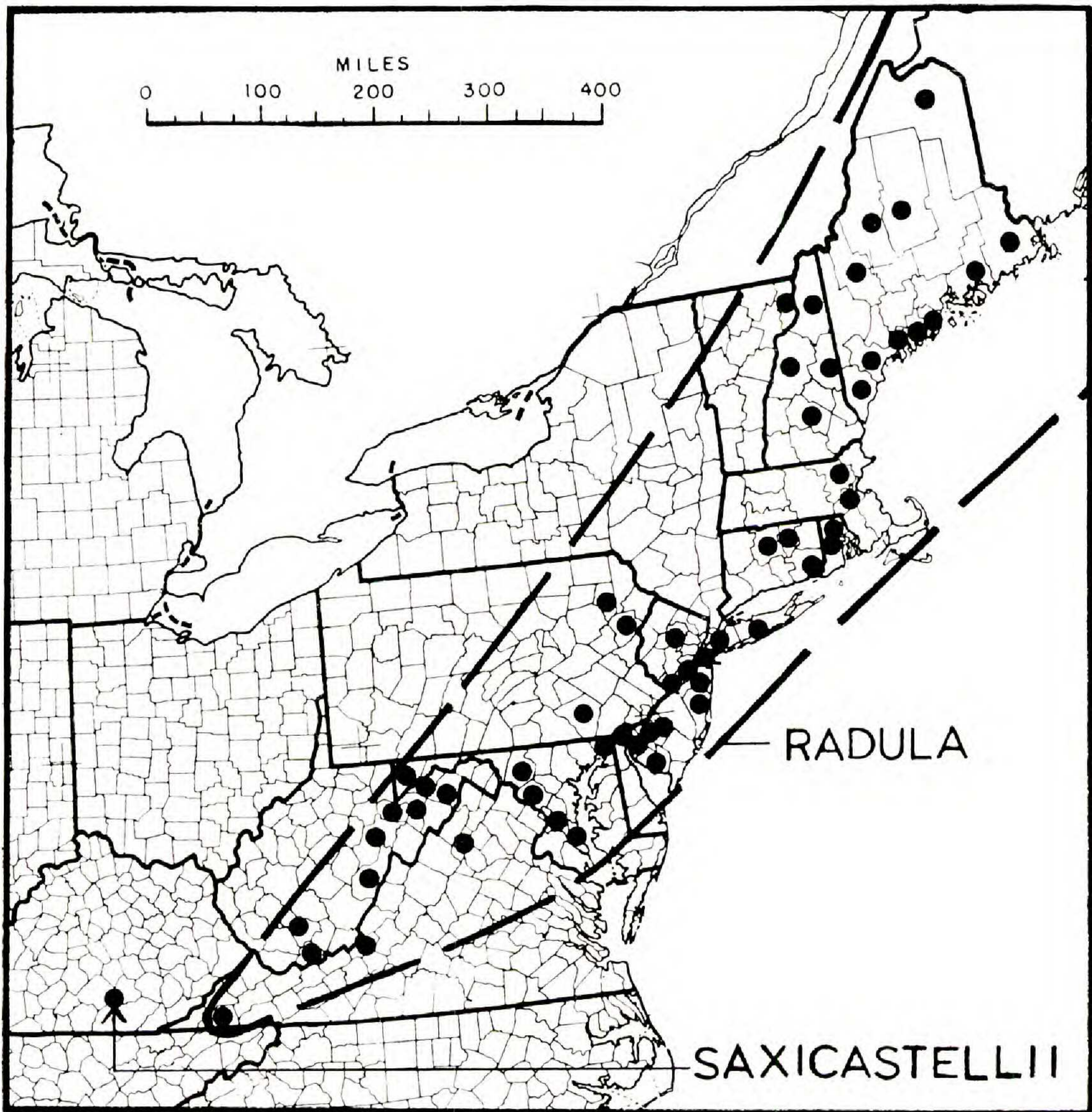


FIG. 2. Map of northeastern U.S.A. showing location of *Aster saxicastellii* and the southern range of *A. radula* (which also occurs in Quebec, New Brunswick, Nova Scotia, Newfoundland and Labrador). Dots represent county records.

through the sandy alluvium that overlies the boulders and cobbles. Most patches are in a shrubby transitional zone, about 3–5 m wide, between the open grassy vegetation on the river-bars and the adjacent forests on terraces or slopes. However, the largest patch found, approximately 50 m × 10 m in area, is in a shrubby area at the back of Pine Island, which is a river bar complex separated from the banks by a high-water channel of the river and by the mouth of Pine Island Branch. The substrate at this site is a jumble of cobbles covered with about 5–25 cm of alluvial sand.

The open grassy vegetation on these bars is typically dominated by *Andropogon gerardii* or *Schizachyrium scoparium*, while the adjacent forest is typically dominated by *Tsuga canadensis*, *Fagus grandifolia* or *Liriodendron*

*tulipifera*. In the transitional thickets where *Aster saxicastellii* is concentrated, *Alnus serrulata* and *Xanthorhiza simplicissima* are often abundant woody species, together with *Liquidambar styraciflua*, *Betula nigra*, *Carpinus caroliniana*, *Rhododendron arborescens*, *Hamamelis virginiana*, *Chionanthus virginicus*, *Viburnum* spp., *Rhus radicans* and others. However, on Pine Island, the most frequent woody plants with *A. saxicastellii* are *Cornus obliqua*, *Betula nigra*, *Hypericum prolificum* and *Viburnum cassinoides*. The most frequent herbaceous associates, based on notes from several patches, include *Osmunda regalis*, *Apios americana*, *Desmodium perplexum*, *Aruncus dioicus*, *Lysimachia ciliata*, *Collinsonia canadensis*, *Rudbeckia laciniata*, *Solidago rugosa*, *Aster umbellatus* and *Senecio aureus*. On Pine Island, additional common associates are *Chasmanthium latifolium* and *Silphium perfoliatum*. Other associates include most of the remaining species typical of forest edges along these rocky banks (Palmer-Ball et al. 1988).

Similar vegetation occurs on boulder-cobble bars along median gradient sections of streams elsewhere in the southern Appalachian region. This is the habitat of several disjunct plant species and endemics (e.g., *Conradina verticillata*) that are important to the biogeography of the southeastern United States (M.E. Medley, in preparation). However, this vegetation has received little intensive botanical study. Much has already been eliminated by impoundments. The unimpounded State Wild River Corridor along the Rockcastle River has one of the most remarkable concentrations of rare species known in Kentucky (Palmer-Ball et al. 1988), including some that are disjunct from northern or montane ranges, i.e., *Comptonia peregrina*, *Magnolia fraseri*, *Oxalis montana*, *Scutellaria elliptica*, *Spiraea virginiana* and *Solidago spathulata* ssp. *randii* (a form with large pale glabrous cypselas).

The discovery of *Aster saxicastellii* underscores the need for further botanical exploration along southern Appalachian rivers. Another new species, *Cypripedium kentuckiense*, was recently described from stream bottoms in eastern Kentucky (Reed 1981), and this occurs near *A. saxicastellii* along the Rockcastle River. It is likely that other important botanical discoveries remain to be made along these rivers. However, in the absence of any further known localities with *A. saxicastellii*, it is currently prudent to consider it for official endangered status.

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